IN THE CLAIMS

Claim 1 (original): A circuit for switching a relay when an active AC voltage on one of the contacts of the relay is approximately zero volts, said circuit comprising:

a monitoring circuit that receives said active AC voltage and outputs a phase--shifted voltage that crosses zero volts at predetermined times before said active AC voltage traverses zero volts;

a pulse generating circuit that initiates a pulse when said phase-shifted voltage enters a predefined voltage region and terminates said pulse when said phase-shifted voltage exits said predefined voltage region; and

a relay control circuit that changes state at a leading edge of said pulse following a change in an input control signal, said relay control circuit connected to a control of said relay.

Claim 2 (currently amended): A circuit for switching a relay when an active AC voltage on one of the contacts of the relay is approximately zero volts, said circuit comprising:

a monitoring circuit that receives said active AC voltage and outputs a phase--shifted voltage that crosses zero volts at predetermined times before said active AC voltage traverses zero volts;

a pulse generating circuit that initiates a pulse when said phase-shifted voltage enters a predefined voltage region and terminates said pulse when said phase-shifted voltage exits said predefined voltage region; and

a relay control circuit that changes state at a leading edge of said pulse following a change in an input control signal, said relay control circuit connected to a control of said relay,

~~The circuit of claim 1~~ wherein said monitoring circuit comprises:

a resistor divider formed of a first resistor and a second resistor connected in series connected between an input and ground with a capacitor across said first resistor and a diode in series with a third resistor across said second resistor; and

wherein said diode conducts when the voltage at a junction of said first and second resistor is positive and said phase-shifted voltage is generated at said junction.

Claim 3 (original): The circuit of claim 1 wherein said predetermined times occur before a zero crossing from a negative voltage to positive voltage and before a zero crossing from a positive voltage to a negative voltage and said predetermined times are equal.

Claim 4 (original): The circuit of claim 3 wherein a predetermined time before a zero crossing from a negative voltage to a positive voltage is greater than a predetermined time before a zero crossing from a positive voltage to a negative voltage by a width of said pulse.

Claim 5 (original): The circuit of claim 1 wherein said the predefined voltage region has limits of 0 volts and +3 volts.

Claim 6 (original): The circuit of claim 1 wherein a leading edge of said pulse is approximately 2.5 msec before the zero crossing of said active AC voltage.

Claim 7 (original): A circuit for providing a pulse a predetermined time before an AC input voltage traverses a zero voltage crossing, said circuit comprising:

a first resistor and a second resistor connected at first ends in series at a junction, a second end of said second resistor forming an output point and a second end of said first resistor connected to an input;

a capacitor connected in parallel across said first resistor, wherein the change in voltage across the second resistor precedes a change in voltage of said input;

a diode having an anode connected to said junction point;

a third resistor having a first end connected to a cathode of said diode and a second end connected to ground;

a first Schottky diode forward connected between said output point and a ground;

a second Schottky diode forward connected between said output point and a positive voltage;

a fourth and fifth resistor connected in series between said positive voltage and ground, in parallel with said first and second Schottky diodes, a connection between said fourth and fifth resistors providing a reference voltage;

a first and second differential amplifier configured to detect respectively when the voltage at said junction is less than said reference voltage and when the voltage at said output is greater than ground; and

a diode network connecting the outputs of said differential amplifiers generating a positive pulse while said junction is between ground and said reference voltage.